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ABSTRACT

This paper attempts to justify the need for research and development in the area of systematic design of genuinely instructional play activities. A discussion of why free play should not be included in curriculum plans is presented as well as a brief discussion of the political problems of including fully educational play as an instructional tool. It is suggested that most teachers of young children do not acknowledge a distinction between educational play and ordinary play, insisting instead that "all" play is learning. It is also argued that the playing-is-learning maxim does not change the common sense in realizing that all play activities are not of equal value or priority for curriculum design, that some promote more desirable learning than others or promote it more efficiently than others. A functional system composed of player, play materials, and play environment is proposed as a conceptual basis for research directed at modifying existing play activities and designing new ones. (JMB)

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EDUCATIONAL PLAY:

A DEFINITION FOR APPLIED RESEARCH[1]

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Introduction

Children's play is now well established as a curriculum activity in educational programs for young children. Most theorists consider play to have close links to children's learning, and most practicing teachers of young children consider it to be indispensable to quality school programs. Unlike curriculum at other levels of school, there generally is wide agreement among preschool and kindergarten teachers about which play activities are suitable for school use. Virtually every reasonably funded early childhood educational environment in North America has a set of blocks, a sand table, a water table, and a housekeeping corner indoors, plus sets of wheel toys and climbing apparatus outdoors.

In spite of the fact that common play activities are widely accepted by both academicians and practicing teachers into school programs, the status of such activities as bona fide "learning" activities is not at all secure. Their reliability as means to the achievement of specifiable learning outcomes is not known, and their validity with respect to learning outcomes specific to school concerns is not established. Even enthusiastic proponents of play curricula are cautious about these issues, suggesting only that play activities "provide opportunities for" or are "good for" the development of various skills and knowledge. For example, in a recent text (Leeper, Dales, Skipper & Witherspoon, 1974), the authors write the following:

> Play with blocks <u>can</u> provide <u>opportunities</u> for the following:
>
> 1. Physical release and the development of muscular coordination through lifting, carrying, and piling.
> 2. Emotional release through dramatic play. The child may express feelings of aggression, hostility, satisfaction of achievement, or fear.

3. Creative expression and the development of a sense of design and form.
4. Cognitive growth through the development of concepts and language opportunities.
5. Development of concepts of size, shape, and number values.
6. Development of readiness for reading through conversation, observation of size and shapes, and the need for additional information from books for his dramatic play (p. 345, italics mine).

The passage above exemplifies well the problem posed by the playing-is-learning psychology of education. To consider a play activity "educational" and to install it as school curriculum because it might exercise knowledge and skills that will be important in later life is to implicitly grant educational value to every waking move a child makes!

There was a time, prior to the discovery of disadvantaged children and before the widespread use of full-time day care, when preschool education was a luxury for children who didn't need it. That time is past. The establishment of institutions for educational purposes, especially for children whose parents work or who are disadvantaged, implies that society holds objectives for children's growth and development that exceed or differ from expectations of what would occur if they were simply left at home or on the streets. It is in the service of the social mandate for predictable and specialized developmental outcomes that the common notion of educational play must be examined. Presently, play activities in school are not included in the concern by educators and citizens for school accountability. If play is ever to become included in that concern, then a sizable task lies ahead.

The most powerful curricular alternative to play learning is direct instruction by teachers, ranging in intensity from structured intervention in children's play activity to teacher directed lessons. While there is nothing wrong with teacher-centred instruction in principle, there is a great deal that renders it undesirable in practice. First, given our apparent ability to train teachers, direct instruction is too often both ineffective and genuinely inhumane. We needn't speculate very long on the probable outcome of a direct-instructional approach to oral language learning in day care centres to anticipate its certain failure. Young children are as undeveloped in their ability to be students of large-group direct instruction as they are in the skills and knowledge they must acquire prior to Grade One. Second, direct instructional models are labor-intensive, with consequent very high monetary cost both for training and for program maintenance. To train and then hire competent personnel to teach children all the things they need to learn, and to do it in groups of five at a time, would require a financial commitment beyond the reach of even the wealthiest society. A powerful piece of play equipment may cost $250.00, but it will instruct for longer than a five-day week.

One of the ways teachers overcome the uncertainties in the relationship between playing and the learning of school knowledge and skills is to intervene in children's play, to add structure that may not be there. A skilled teacher can do this without disrupting the integrity of the playing. A common example of this play-management strategy is the teacher's joining the activity as parallel player and then initiating careful conversation. While this use of play is very defensible pedagogically, two observations are in order: (1) if the teacher's intervention is essential to predictable learning then the child is not learning through play as fully as the playing-is-learning proponents imply; (2) since play

intervention will probably be successful only with relatively small pupil-teacher ratios, the problem of labor-intensiveness in early childhood educational programs is not alleviated.

Unlike direct instruction, play has yet to be genuinely subjected to efforts to design educational environments. The play activities in day care centres and kindergartens are carryovers from good homes, where the bulk of the responsibility for learning is in a social environment with a 2-to-3 adult-child ratio. Kindergartens are lucky to have a 1-to-25 ratio, and day cares a 1-to-6 ratio. In this regard, day care presents the greatest concern, since day care "pupils" spend as many as nine of their twelve waking hours in its environment, and its personnel are typically not highly trained as teachers. To place children in a reduced social environment vis-a-vis the nuclear family and in a merely equivalent physical environment runs the risk of programming retardation.

If play really can lead to learning -- and let us assume for the moment that it can -- then certain kinds of play should be able to lead to certain specific kinds of learning predictably. The problem for applied researchers, therefore, becomes one of taking dependent outcome variables from the expectations and entry requirements of higher levels of schooling and then of identifying independent variables in the physical and social environment that produce those outcomes through play behaviors.

The purpose of this paper, therefore, is to justify a relatively neglected area of research and development in education, namely the systematic design of play activities that are genuinely instructional, activities that do not depend upon teacher intervention for educational power, even if they may be enhanced somewhat by it. The second purpose of this paper is to propose for critical examination a conceptual basis for research applied to educational problems, both for the modification of existing play activities and for the design of new ones.

Play and the Problem of Structure

Public schools are expected to guarantee learning that would not typically occur if children were left at home or in the streets. Day care centres and preschools are expected to guarantee learning that would normally occur in a good home, but under much less favorable conditions. In both cases, successful execution of the mandate requires that structure of some kind be imposed upon children's behavior. The most obvious and the most popular means of structuring children's behavior for educational purposes is to place them under the authority of an adult who is charged with the task of designing the interaction between his own and the children's behavior in systematic ways, so that certain terminal student behaviors are predictable. We label this process with an etymologically related term, "instruction". The entirety of modern educational psychology is referenced to such a model.

Play behavior has no meaningful place in an educational psychology within which the locus of structure is teacher-pupil behavior. By definition,[2] play has at least one distinguishing feature which precludes teacher-based structure; play is generally considered to be player-centred, meaning that it is player-initiated, player-paced, and player-styled. Anyone who has ever tried to use primitive force to cause a child to play, to make him continue to play, or even to make him play in specific ways can appreciate the importance of the voluntary character of the activity. Even the systematic application of extrinsic rewards for desirable play behavior entails a risk that the intervention will be destructive and counter-productive (Greene & Lepper, 1974).

In the design of curriculum, the variables over which we have the most complete and direct control are those in the physical and social environment, regardless

of whether our control is in the form of teacher directives or the size of play blocks. Our control over predispositional and trait variables in the learners is largely indirect and much less complete, especially in the case of independent children's play, during which the learner is largely outside the influence of formative teacher-generated reinforcers. The most powerful educational play designs, therefore, will be those that are not sensitive to individual differences in the predictability of learning outcomes. Failing that, powerful play will shape learners' predispositions to desirable points from a broad range of entry characteristics.

As soon as we begin to consider the role of play-predispositional and environmental factors in the determination of the character of play, traditional definitions become inappropriate. This is especially true if we are to consider the problem of designing play activities for instructional purposes. Suppose, for example, we found that we could double the time spent in block play by making the blocks assymmetrical in density (as by embedding lead weights in one side only). The hypothetical change in behavior will have occurred, not as a result of a change in the children, but because of a change in the blocks. The traditional definition, with its commitment to "self-initiation" and "self-maintenance" (i.e. without external control), cannot be applied.

Given the definitional restriction that play be free of direct external control by non-players (especially teachers), the locus of its educational structure will have to be either the predispositional characteristics of the player, the characteristics of the play environment, or some functional combination of the two. Very little research of any kind has been done in this area, so that little is known about the relationships among the myriad of potentially important variables. Pulaski's (1973) landmark study of five-to-seven year-old children investigated the effects of both player and environmental variables on the level of imagination

in play. Pulsaki found (a) strong support for the effects of player predisposition to fantasy, (b) some evidence for the effects of sex and of the structure[3] in play materials, and (c) no support for interaction effects.

Such research is important to our concern for school learning, if only because of its evidence that measurable relationships do exist. As with aptitude-treatment interaction studies of teacher effectiveness, however, Pulaski's finding of strong effects for player predispositions on the character of the play suggests a critical problem for the justification and design of genuinely educational play curriculum, namely that of coming up with play equipment and materials that have instructional power across a broad range of learner characteristics.

When constructing a classical definition of a term, the term is placed in its nearest class and then differentiated from all other members of that class. Thus, to classify play as a kind of activity constrains the list of distinguishing features (vis-a-vis all other activities) to be referenced to the player. As we have noted, such a definition is difficult to apply to design problems because actor variables are largely outside our direct control. The traditional definitions of play were constructed in order to identify the phenomenon if we should see it, not in order to plan it. If we are interested in planning play for educational purposes, then we may be well advised to approach the phenomenon by means of variables that are under our direct control, namely the characteristics of the play environment.

Play and the Power of Environment

The foregoing analysis suggests that the play environment, rather than the player or the play activity, may be the most productive point of focus for applied research, simply because its characteristics are amenable to direct measurement and control. Thus, where applied research in traditional educational psychology involves the direct manipulation of teacher and pupil behavior, research on instructional play will most appropriately be concerned with "environmental behavior". The task remaining is to construct a general design equation for applied research.

Given our commitment to the general objective of developing educational play as a full curricular partner to teacher-based direct instruction, the logical dependent variables in the play-design equation will be measures of pupil behavior that represent the achievement of learning objectives held by the school. This is critical if we are to be able to replace expressions such as "can provide opportunities for" with alternatives such as "will reliably produce in the learner" in textbooks for teachers of young children.

Implicit in the present argument and critical to the objective of validating play as curriculum is an assumption that the player and his environment can be described as a dynamic system. Thus the relationships between the variables within the system and the output behavior of the system as a whole (measured as the dependent variables) will be assumed to be determinate, if not yet discovered. In the present analysis, the system as a whole may be considered to consist of two general sets of variables, those representing the player and those representing his environment. The total environment may be broken further into two distinct subsets: (1) the characteristics of the plaything or play materials, and (2) the larger play environment, including (a) physical and (b) social features. The distinctions between such variable sets are functional rather than topographical. Thus while all three subsets of environmental variables have common features, it may be wise to consider their tentative roles in the

design equation as distinct.

The player. The variables which represent the play will be those that promise, on the basis of non-applied research, to affect the dependent variables, including indices such as I.Q., imaginativeness, creative potential, sex, and past experience. In most cases, where the variables are outside our direct control, such variables should enter the equation as co-variates, as insurance that the designs that emerge are general.

The play materials. A plaything may be defined as that part of the total environment which is dynamically related to the behavior of the player. A set of blocks, therefore, may be considered playthings, since they are manipulated directly by the player and are critical to the occurrence (i.e. block-play cannot occur without blocks). The variables of interest in the present context will be those features of the plaything which can be systematically linked to player behaviors representing learning outcomes. Because such variables are within our direct control, they enter the design equation as variables to be manipulated.

The play environment. The larger play environment may be defined in the present context as that set of features of the total environment which affects the dynamic interaction between the player and the plaything but which remains constant throughout a given unit or episode of play behavior. The structure of the walls (e.g., position, color) may include physical features which affect the visual salience of a plaything, thereby the frequency with which children approach the plaything, and ultimately the learning that results. Such variables are reasonable candidates for experimental manipulation and control.

Some of the important variables in the social environment are those dictated by the definition of play selected. Thus, for example, the voluntary character of

play can be operationalized negatively to obviate intervention in the child-plaything interaction (e.g., by teachers). The definitional variables, therefore, function as design constraints. Other variables, however, may be entered as experimental ones, such as the number of children in the environment, the rules for pupil conduct, and so forth.

At the current stage of our inquiry, it is enough to require that our hypotheses make simple common sense. The distinctions and definitions offered here are only tentative of course, with their final form and the relationships between them to be worked out through critical discussion and research. Some conceivably important variables are difficult to classify in the above system, such as block color, for example. The classification of such variables however, is not as important at this point as the mere recognition that they may be important.

We don't have to await systematic research to know that children might learn the principles of a lever by playing with a couple of large objects and stick. But we do need systematic research and development to discover and validate the specific features of a leverage-learning environment that will guarantee the achievement in an acceptable proportion of normal children under conditions identifiable as play. To cite another example, we don't need research to establish that there will be some kind of difference in the behavior produced by a water table stocked with different-sized water pistols in place of the standard variety of cylindrical containers. We do need research, however, to determine whether properly designed water pistols might instruct children in hydraulics as well as in concepts of quantity. The example may be somewhat facetious, but the principle is not.

Play and the Possibility of Instruction

The number of variables, even potentially important variables, in the system and systems that determine the outcomes of play behavior is virtually infinite. If we are to avoid endless regression equations and controlled-to-the-point-of-paralyzed experimental designs, we would be well advised to establish a frame of reference that will enable us to select and organize design variables. Since there is a respect in which we are concerned with the environment-as-instructor, traditional educational psychology may suggest a starting point.

In an earlier paper, (Gehlbach, 1976), I suggested that a play activity may be considered educational to the degree that it incorporates instructional functions normally performed by a teacher, including the following:

a) the effective specification of an incremental knowledge or skill objective, such that players tend to identify and adopt increasingly sophisticated objectives for themselves upon repeated engagements in the activity;

b) the effective provision of practice in the application of the knowledge or in the exercise of the skill, such that players tend to persist in the activity;

c) the delivery of discriminative feedback, referenced to the learner's objective, so that players are aware of the degree of their success (p. 26).

Within the frame of reference, it was suggested that a fully educational play activity would be one that included all three component events, with play activities falling short of that best regarded as teaching aids. The present discussion affords a sharper focus on that distinction, having clarified the design problem.

Specification of learning objectives. The perceived objective of the child in play and the learning objective of the designer of the play materials will not always be the same. While a child may occasionally gratify the designer of a construction

toy, for example, by explicitly "trying" to figure out how to arrange the pulleys so that he can amplify the speed of a shaft, such concurrence between the player and the designer is not necessary. To continue an earlier example, a two-year old may be trying to stack blocks, while the block designer is trying to produce behavior that signals an understanding of centre-of-gravity relationships.

Perhaps the most important way in which a plaything controls the learning objectives of the player, explicit or implied, is via its response to player behaviors. In their conclusion to an important dialogue with Jean Piaget on the role of play in cognitive development, Herron and Sutton-Smith (1971) write, "If play contributes anything of worth to constructive intelligence, it is most probably novel responses or novel signifiers (p. 342, italics mine)." If novel behavior is a general and reliable occurrence in play behavior, then it may serve as the fulcrum for our instructional lever. Within the framework of operant learning, the novel (or random) response is the first positive step in the learning process. To revive our example, the corresponding first step in the predictable learning of centre-of-gravity relationships may be the accidental-but-predictable novel orientation of an L-shaped block on a stack. This subject will be approached from a different perspective later in this section.

The provision of practice. The value of play as an effective provider of practice is perhaps the most completely documented aspect of its educational potential. As I implied in the introductory discussion, however, the popular concern for the promotion of a playing-is-learning theory of early education has obscured the value of play as simple practice by recklessly implying that all play is much more than mere practice.

Within an instructional design context, the features in play materials that must be secured are those which guarantee sustained interaction between the player and the play materials. For it is only sustained player behavior (including novel behavior)

that is likely to accumulate instructionally-based, rule-governed data for the learner. We may speculate that the sustenance of desirable practice play will also be controlled by the feedback responses from the materials. The importance of this may be illustrated by considering a common manual typewriter as a plaything. Children seem to like typewriters well enough. But the typical two-year old seldom plays very long because the design of the machine is such that the keys jam within seconds of the initiation of play. The important thing here is that it is perceived objective of the learner, rather than the learning objective of the provider of the machine, that has been violated and that underlies the cessation of the activity.

The provision of discriminative feedback. While the feedback that sustains practice play behavior will be referenced to the learner's achievement of his own objective, the feedback that provides the instructional muscle in a play activity will be referenced to the learner's achievement of the designer's behavioral objective. This point may be illustrated by the way in which standard, symmetrical building blocks may subvert the learning of centre-of-gravity relationships. Since optimally-high block towers can be achieved simply on the basis of visual-tactile alignment of the blocks, the centre-of-gravity of the blocks is not a variable in the block-play equation. If we were to design for the learning of centre-of-gravity relationships, then we would have to design the blocks with the location of the centre of gravity a salient variable. One way to make it salient is to make it independent of the geometrical centre of an object.

The biggest problem in the design of play materials may prove to be the achievement of both player-referenced and school-referenced feedback properties simultaneously. To succeed in the first while failing in the second will yield behavior that is fun

but not self-sufficient instructionally except by accident. To succeed in the second while failing in the first will yield behavior that will be instructional but sustained only by abandoning its character as play.

Play and the Problem of Politics

It is probably a safe prediction that research on the instructional effectiveness of playthings will produce nothing but trouble for those who conduct it, especially if classical play activities are found to be instructionally weak. Literally thousands of teachers and several hundred academicians will be appalled by the idea of controlling children's behavior through the manipulation of environmental variables. The assumption behind such a reaction, however, namely that the traditional playthings do not control player behavior, is faulty. Since we have never identified the variables, it simply appears that the child is in complete control. Thus, we don't really know whether common play materials belong in a school that is committed to predictable learning outcomes. The research and development proposed here is not subversive with respect to traditional attitudes toward children. The mere suggestion that the definition of play be considered a constraint in play design assures that.

As I suggested earlier, it is time to get serious about educational play. Millions of children are spending billions of hours in child care centres and public school classrooms engaging in play. Because they are spending that time

doing play, they are not doing other things that may be critical to later school achievement, particularly if they are disadvantaged, retarded, or simply deprived of normal exposure to family. If we knew that play were a reliable learning activity, there would be no problem. We don't know that. We are being asked to have faith in it, and that is not good enough.

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Footnotes

1. The author gratefully acknowledges the critical support received from Jack Martin, Milt McClaren, Ken Marx and Phil Winne in the development of the ideas presented in this paper.

2. For comprehensive theoretical discussions of children's play, see Herron & Sutton-Smith, 1971, and Singer, 1973.

3. The term structure as used by Pulaski refers to the degree of stimulus specificity in toys, as in the difference between a miscellaneous collection of "dress-up" clothing and a selection of ready-made Halloween-type costumes.